

Comments on Water Use Efficiency Measures

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The evaluation of water use efficiency first requires a definition of what the term "water use efficiency" implies, which is based on the purpose of the evaluation. Physical and economic efficiency measures are available and both can be useful indicators for water management at all levels. However, the relative values of physical efficiency or economic efficiency measures may indicate different directions for water policy and investments in irrigation, water storage and/or delivery infrastructure. In addition those values may result from a number of factors that are not directly related to the capacities and capabilities of existing water storage and delivery systems.

Physical measures such as crop production per unit of water application present a number of specific challenges. Measuring the amount of water applied to a specific area and the corresponding production yield from that area is straightforward. Assigning causality for production volumes to water application rates is not easily determined. The yield of any crop from a given area depends on many factors. Water is important, indeed sufficient water is a necessary condition for crop production. However the amount of additional inputs such as chemical fertilizers, inherent soil quality, specific climate conditions such as daytime/nighttime temperatures and other factors all influence the yield per area of any given crop production enterprise. Accordingly the weight of crop production alone is only one determinant in optimal allocation of water resources among cropping alternatives for a given region and/or among regions.

Likewise the economic efficiency of water use cannot be assigned solely to the gross revenue for crops produced per unit of applied water in a given area. Crop output in any period depends on a number of factors described above and associated water use requirements vary depending on the weather in a given crop year. Likewise the value of any crop and the cost of non-water production inputs can be subject to significant market variations resulting in conditions of high gross revenues but net losses for farmers. The value of many crops is also dependent on factors related to the demand for their related end use product as well as the relative supply/demand balance associated with the crop itself. For example end use demand for dairy products, both domestic and foreign, can influence alfalfa crop values. In California using a gross revenue only measure provides an increase in value of applied water of around 31 percent between 2000 and 2007, from \$1,048 to \$1,373 per acre foot.¹

¹ Rich, Jim DWR, DPLA, CA Water Plan Update 2009 Vol 4 Reference Guide, August 4, 2009